REMARKS

Claims 1, 10, 19 and 21 have been amended. Claims 1-14 and 16-21 remain for further consideration. No new matter has been added.

The objections and rejections shall be taken up in the order presented in the Official Action.

10-26. Claims 1-14 and 16-20 currently stand rejected for allegedly being obvious in view of Haan's "True-Motion Estimation with 3-D Recursive Search Block Matching" (hereinafter "Haan").

CLAIM 1

As amended, claim 1 recites a method for determining a selection vector which represents a displacement vector for a displacement of an image area from a first position in a first image to a second position in a second image. The method includes the steps of:

> "a) supplying a set of prediction vectors;
> b) supplying a predetermined set of test vectors;
> c) selecting at least one test vector from the set of test vectors, and performing an image comparison between a first image area in the first image and a second image area in the second image to obtain an image comparison result, where a position of the second image area is displaced relative to the first image area by the at least one selected test vector;
> d) comparing the at least one selected test vector with at least one selected prediction vector to obtain at least one vector comparison result for each selected test vector;
> e) supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector, and from the vector comparison result for each selected test vector;
> f) determining a ranking order of the quality characteristics; and
> g) selecting one of the selected test vectors as the selection vector from the predetermined set of test vectors based on the ranking order of the quality characteristics." (cl. 1, emphasis added).

The Official Action maintains the contention that Haan teaches "*comparing the at least one selected test vector with at least one selected prediction vector to obtain at least one vector comparison result*

for each selected test vector (page 373, col. 1 and eq. 26)" where "*||U(X,t)|| represents the comparison result between the given prediction vector and its corresponding test vector.*" (Official Action, pg 7). The Official Action also contends that Haan teaches "*supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector and from the vector comparison result for each selected test vector (page 373, col. 1 and eq. 26)*" where the "*quality characteristic used in Haan is e(C,X,t)....*" (Official Action, pg 8). Applicants again respectfully submit that the aforementioned characterization is an improper reading of Haan.

HAAN FAILS TO DISCLOSE OR SUGGEST "COMPARING" AS CLAIMED

The Official Action acknowledges that the vector U(x,t) detailed in equations 20 and 22 of Haan are functions of a look-up table and counter. See Official Action, pg. 3. The Official Action then attempts to undo this acknowledgement by stating *"**however**, the Examiner would like to point out that this derivation of U(X,t) is **just one of several versions** of U(X,t) happened to be used in the version of U(X,t) and the equations (20 and 22) pointed out by the Applicant is just one instance of U(X,t) that happened to be used for evaluation purposes (Haan, p 372, col, l, ln 1-7: "final version", with relation to the 3-D RS block matcher)."* (emphasis in original, Official Action, pg. 3). This contention in the Official Action is wholly unsupported by a fair and proper reading of Haan. Specifically, it is worth nothing that although Haan makes the statement *"[f]or this final version of the 3-D RS blocker matcher"* (Haan, p 372, col, l, ln 5-6), the final version is the only embodiment he discloses or suggests. A fair and proper reading of Haan fails to reveal any embodiment other than the one that employs the look-up table and counter. The Official Action points to Equation 26 of Haan in support of its contention that Haan discloses versions other than the final version, but

Equation 26 merely recites an error value *e(C, X, t)*. Simply states the non-final versions are simply not disclosed in Haan.

In addition, Haan teaches in equations (16) and (17) that the update vector U is a function of the displacement vector D(x, t). "*The resulting estimated displacement vector D(x, t)... equals the candidate vector C(X, t) with the smallest error e(C, X, t).... Error are calculated as summed absolute differences (SAD): e(C, X, t) = Σ |F(x, t) – F(x – C, t – n.T)| where F(x, t) is the luminance function and T the field period.*" (Haan, pg 369, col. 1). That is, the displacement vector is chosen to correspond to the candidate vector having the smallest error e(C, X, t). Thereafter, Haan teaches in equations (20) and (22) that the update vector $U_a(X, t)$ is an element of the set $\{0, lut(N_{bl}(x, t) \bmod p)\}$, where N_{bl} is the output of a block counter, lut is a look-up table function, and p is not a factor of the number of blocks in a picture. (Haan, pg 372, col. 1) Thus, the norm of U(X, t), i.e., ||U(X, t)||, as used in equation (26), is a function of the candidate vector. The definition that the Official Action attempts to apply to ||U(X, t)|| is contrary to the definition of the norm known from linear algebra. **That is, ||U(X, t)|| is not a function of the candidate vector and the prediction vector.** In addition, Equations 16 and 17, simply define the update vector U as:

$$\underline{U} = \begin{pmatrix} \pm L \\ 0 \end{pmatrix} \vee \begin{pmatrix} 0 \\ \pm L \end{pmatrix}$$

In this definition of the vector U, the operator "v" merely indicates a logical OR. Therefore, U(x,t) cannot be a function of both the candidate and the prediction vectors, as the alleged in the Official Action – it is only a function of the selected one of the vectors. It is respectfully submitted that the norm ||U(X, t)|| is incapable of teaching or suggesting the feature of "*comparing the at least one selected test vector with at least one selected prediction vector from a set of prediction vectors to*

obtain at least one vector comparison result for each selected test vector;" (cl. 21, emphasis added). Consequently, Haan is also incapable of teaching or suggesting obtaining at least one vector comparison result. Therefore, Haan also fails to teach or suggest the feature of "*supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector, and from the vector comparison result for each selected test vector*" (cl. 21, emphasis added).

HAAN FAILS TO DISCLOSE OR SUGGEST "SELECTING" AS CLAIMED

the Official Action acknowledges that "*Haan fails to disclose determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking of the quality characteristics.*" (Official Action, pg 8). The Official Action then states "*there are a wide variety of operations that could be used to find a test vector with the smallest error, including calculating the error of multiple test vectors, sorting them by maximum or minimum error and then appropriately selecting the desired vector by rank.*" (Official Action, pg 8). The Official Action then concludes that "*it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method outlined by Haan, the step of determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking order of the quality characteristics.*" (Official Action, pg. 8). This rationale is incorrect for several reasons.

The Official Action has only given a technically vague and legally lacking assertion that the claimed features of determining and selecting are known in the art based upon the teachings set in the Haan. Assuming, without admitting, that these features are known in the art, there is no rational of record to properly indicate that these feature could even be combined with the teachings of Haan.

Specifically, Haan teaches that "[*for*] *the 3-D RS block matcher, the spatial consistency could guarantee that, after reaching a converged situation at the boundary of a moving object, no other vectors will be selected.*" (Haan, pg 372). Thus, Haan teaches a method of convergence to select a vector. It is respectfully submitted that Haan is incapable of supporting an obviousness rejection of the method of claim 1, which includes the claimed feature "*selecting one of the selected test vectors as a selection vector from the predetermined set of test vectors based on the ranking order of the quality characteristics*" (cl. 1).

CLAIM 19

It is respectfully submitted that claim 19 is patentable for at least the same reasons as set forth above with respect to claim 1.

27. Claim 21 currently stand rejected for allegedly being obvious in view of Haan and U.S. Patent 5,327,232 to Kim (hereinafter "Kim").

As amended, claim 21 recites a method performed in a processor for determining a selection vector which represents a displacement vector for a displacement of an image area from a first position in a first image to a second position in a second image. The method includes:

> "a) selecting at least one test vector from a set of test vectors, and performing an image comparison between a first image area in the first image and a second image area in the second image to obtain an image comparison result, where a position of the second image area is displaced relative to the first image area by the at least one selected test vector;
>
> b) comparing the at least one selected test vector with at least one selected prediction vector from a set of prediction vectors to obtain at least one vector comparison result for each selected test vector;
>
> c) supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector, and from the vector comparison result for each selected test vector;

d) determining a ranking order of the quality characteristics;

e) selecting one of the selected test vectors as a selection vector from the predetermined set of test vectors based on the ranking order of the quality characteristics;

f) generating an updated set of test vectors which includes the test vector selected as the selection vector; and

g) repeating steps (a) to (e) using the updated set of test vectors; and

h) outputting a signal from the processor representative of the updated selection vector."

HAAN FAILS TO DISCLOSE OR SUGGEST "COMPARING" AS CLAIMED

As set forth with respect to claim 1, Haan teaches in equations (20) and (22) that the update vector $\underline{U}_a(\underline{X}, t)$ is an element of the set $\{\underline{0}, \underline{lut}(N_{bl}(\underline{x}, t) \bmod p)\}$, where N_{bl} is the output of a block counter, lut is a look-up table function, and p is not a factor of the number of blocks in a picture. (Haan, pg 372, col. 1) Thus, the norm of $\underline{U}(\underline{X}, t)$, i.e., $\|\underline{U}(\underline{X}, t)\|$, as used in equation (26), is a function of the candidate vector. **That is, $\|\underline{U}(\underline{X}, t)\|$ is not a function of the candidate vector and the prediction vector.** In addition, Equations 16 and 17, simply defines the update vector U as:

$$\underline{U} = \begin{pmatrix} \pm L \\ 0 \end{pmatrix} \vee \begin{pmatrix} 0 \\ \pm L \end{pmatrix}$$

In this definition of the vector U, the operator "v" merely indicates a logical OR. Therefore, U(x,t) cannot be a function of both the candidate and the prediction vectors, as the alleged in the Official Action – it is only a function of the selected one of the vectors. It is respectfully submitted that the norm $\|\underline{U}(\underline{X}, t)\|$ is incapable of teaching or suggesting the feature of "*comparing the at least one selected test vector with at least one selected prediction vector to obtain at least one vector comparison result for each selected test vector....*" (cl. 1, emphasis added). Consequently, Haan is also incapable of teaching or suggesting obtaining at least one vector comparison result. Therefore,

Haan also fails to teach or suggest the feature of "*supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector, and from the vector comparison result for each selected test vector*" (cl. 1, emphasis added).

HAAN FAILS TO DISCLOSE OR SUGGEST "SELECTING" AS CLAIMED

Again, as set forth above concerning claim 1 and applied to claim 21, the Official Action acknowledges that "*Haan fails to disclose determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking of the quality characteristics.*" (Official Action, pg 8). The Official Action then states "*there are a wide variety of operations that could be used to find a test vector with the smallest error, including calculating the error of multiple test vectors, sorting them by maximum or minimum error and then appropriately selecting the desired vector by rank.*" (Official Action, pg 8). The Official Action then concludes that *"it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method outlined by Haan, the step of determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking order of the quality characteristics."* (Official Action, pg. 8). This rationale is incorrect for several reasons.

The Official Action has only given a technically vague and legally lacking assertion that the features of determining and selecting are known in the art and combinable with the Haan reference. Assuming, without admitting, that these feature are known in the art, there is no rational of record to properly indicate that these feature could even be combined with the teachings of Haan. Specifically, Haan teaches that "[*for*] *the 3-D RS block matcher, the spatial consistency could guarantee that, after reaching a converged situation at the boundary of a moving object, no other vectors will be*

selected." (Haan, pg 372). Thus, Haan teaches a method of convergence to select a vector. It is respectfully submitted that Haan is incapable of supporting an obviousness rejection of the method of claim 21, which includes the claimed feature "*selecting one of the selected test vectors as the selection vector from the predetermined set of test vectors based on the ranking order of the quality characteristics*" (cl. 21).

For all the foregoing reasons, reconsideration and allowance of claims 1-14 and 16-21 is respectfully requested.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,

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